APPLICATION OF ARTIFICIAL NEURAL NETWORK FOR SOLVING UNIT COMMITMENT PROBLEM

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DECLARATION

I hereby declare that this research report together with all of its contents is no other than those of my own work, except for some information taken and extracted from other sources that have been quoted respectively.

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ABSTRACT

Artificial Neural Networks (ANNs) are general purpose optimization techniques based on principles inspired from biological neurons in the brain which consists of a number of simple and highly interconnected processors (neurons). ANN has proved to be able to solve optimization problems in power system. One of the areas in power system operation that requires optimal solution is the Unit Commitment (UC) problem. The UC problem involves determination of start-up and shut-down schedule of generating units, and indirectly determines the optimum power should be generated by each unit committed over a period of time to meet the forecasted load demand at minimum cost. Besides that, the commitment schedule must satisfy other constraints in order to minimize the total production cost. Therefore, this constitutes a problem to the operators, where they find it difficult to make the decision manually on which unit to keep online, and which unit to switch to offline, in order to minimize the production cost. The ANN approach has proved to be able to solve the UC problem but involve several problems such as divergence, excessive computation time, too much iteration for solving small task and so on. In order to improve the implementation of ANN for solving UC problem in power systems, this paper presents a comparison study between standard backpropagation algorithm, extended backpropagation algorithms and hybrid approach. The ANN used to forecast the power of four generating units in a small power system consists of multilayer neural network which consists of three input nodes, several hidden nodes and five output nodes. Besides that, input parameters involve are current stage of load demand (first stage to sixth stage), current load demand (megawatt) and previous load demand (megawatt), while the outputs of the neural network are power generated by four thermal units at current stage and total cost.